

REMARKS

The parent application to the present divisional application, Serial No. 09/405,349, was allowed and issued as U.S. Patent No. 6,318,384 on November 20, 2001. Among the '384 patent independent allowed claims are:

1. A method of etching films comprising:

(a) loading a substrate having an exposed layer into an etch reactor having deposits formed therein during an etch process conducted on another substrate;

(b) conducting another etch process on the loaded substrate that removes said exposed layer and said deposits; and

(c) conducting said an etch process on the loaded substrate.

8. A method of etching a trench in a silicon substrate and cleaning a reactor comprising:

(a) loading a silicon substrate into an etch reactor having deposits from another silicon substrate formed therein, said substrate having at least one layer of material formed thereon;

(b) conducting a first etch operation that removes a portion of said at least one layer of material and the deposits; and

(c) conducting a second etch operation that removes a portion of said silicon substrate and forms deposits in said etch reactor.

33. A method of etching substrates comprising:

(a) loading a substrate having at least two layers formed thereon into a first etch reactor and conducting an etch process to remove a portion of said at least two layers to expose a portion of a layer;

(b) loading said substrate having a portion of a layer exposed into a second etch reactor, said second reactor having deposits formed therein from another substrate;

(c) conducting a first etch process in said second etch reactor on said substrate having a portion of a layer exposed that removes a portion of said exposed layer and said deposits;

(d) conducting a second etch process in said second etch reactor that removes a portion of the silicon substrate and forms deposits inside said second etch reactor; and

(e) without removing said deposits formed by said second etch operation, loading into said second etch reactor a second substrate having a portion of a layer exposed.

A common theme of each of these methods is the introduction into a process chamber of a substrate which includes an exposed layer which, during etch of the substrate, produces a cleaning material which helps remove deposits present on the process chamber surfaces. The deposits were created during previous etching of a substrate in the process chamber. During continued etching or subsequent etching of the substrate, new deposits are created on the process chamber surfaces which will be cleaned off during processing of the next substrate. Such a self-cleaning etch process offers obvious advantages in terms of requiring less down time for process chamber cleaning. Additional details supporting the amendment of the presently pending claims to correspond with this common theme are present in applicants Specification as originally filed at Page 8, lines 18 - 23: "In an embodiment of the present invention, the layer to be etched is compatible with the deposits formed withing the chamber. Advantageously, processing efficiencies are realized since a single step is utilized to process a substrate while cleaning the deposits produced by processing the previous substrate. In this way, etching a layer on one substrate is combined with cleaning the residue formed from etching a previous substrate."

The present application pertains to an apparatus which includes, as an element of the apparatus, a computer readable storage medium having program code embodied therein for controlling the apparatus to carry out a patentable process/method per the '384 patent. The apparatus includes a controller, which makes use of the program code in the readable storage medium to instruct various devices which are part of the apparatus, which devices are used to carry out the patentable method.

The Examiner has argued case law to the effect that it is not an "invention" to broadly provide mechanical or automatic means to replace manual activity which has accomplished the same results. However, that is not what applicants are doing here. Applicants' patentable apparatus contains readable program code which controls the apparatus so that the apparatus carries out a novel and non-obvious method which has been patented by applicants. Without applicants' invention of the method which has now been incorporated into the apparatus in the form of a readable storage medium, the results could not

be accomplished manually, because prior to applicants' invention of the method, there was no manual activity which accomplished the same results.

The Examiner has argued case law that the inclusion of material worked upon by a machine as an element in a claim does not lead to patentability, and that there is no patentable combination between a device and the material upon which it works. In the present instance, applicants are not relying on a combination of an apparatus and the material upon which it works to provide patentability. Applicants' independent apparatus claims recite an apparatus which contains program code as a part of the apparatus itself, where the program code controls the apparatus to carry out a patentable method. If the method is patentable, then the program code which instructs the apparatus to carry out the method is patentable, and that program code has been inserted into an apparatus in the form of a readable storage medium, whereby the apparatus becomes patentable.

It appears to applicants that the most applicable case law is *In re Beauregard*, 53 F. 3d 1583, 35 U.S.P.Q. 2d (BNA) 1383 (Fed.Cir. 1995). The *In re Beauregard* case pertained to the patentability of a computer program product claim. Originally, the Patent and Trademark Office had argued that computer programs embodied in tangible medium were not patentable subject matter. Subsequently, the Patent Office requested that the appeal be withdrawn, conceding that computer programs embodied in a tangible medium are patentable subject matter. In the present instance a computer program in the form of a tangible medium is an element of the apparatus which is being claimed. Since the subject matter of the program, a method for processing a substrate in a particular manner, has been held to be patentable, applicants contend that a program in a tangible medium for carrying out the patentable method is also patentable. Since this program in a tangible medium has been incorporated into the apparatus, it is a novel and non-obvious element within the apparatus, rendering the apparatus patentable.

Applicants have amended Claim 37 to more closely recite the connection between the readable storage medium and the method found to be patentable in the '384 patent. Applicants have also requested that Claim 38 be cancelled without prejudice, since it is clear in Claim 37 that the etch process is a plasma etch process and Claim 38 adds no new recitation. Claim 39 has been amended to refer to Claim 37, in view of the cancellation of Claim 38. Claims 40, 43 - 44, 46 - 47, and 49 have also been amended

to more closely recite the connection between the apparatus readable storage medium and the method which is being carried out.

Claim Rejections Under 35 USC § 103

Claims 37 - 55 are rejected under 35 USC § 103(a) as being unpatentable over U.S. Patent No. 6,136,211, to Qian et al.

Applicants respectfully contend that the Qian et al. process did not render obvious the subject matter of applicants' patented method and does not render obvious the subject matter of an apparatus which contains applicants' patented method in the form of program code in a readable storage medium. Qian et al. pertains to a process for etching a substrate in an etching chamber while simultaneously cleaning a thin, non-homogeneous etch residue deposited on the surfaces of the walls and components of the etching chamber. In the Qian et al. process, "cleaning gas is added to the process gas for a sufficient time and in a volumetric flow ratio that is sufficiently high, to react with and remove substantially all of the etch residue deposited by the process gas". (Abstract) In applicants' method, it is a layer of material present on the substrate which is used to provide a cleaning material helpful in the removal of residue deposited on the surfaces of the etching chamber apparatus. This invention was not even suggested in the Qian et al. process which specifically added cleaning gas to the process gas to facilitate residue removal. Qian et al. is cited by the Examiner as disclosing an RIE etching apparatus which is equipped with means for forming plasma using an RF inductively coupled coil which surrounds the plasma etching chamber. The Examiner acknowledges that Qian et al. fails to disclose the process which is claimed by applicants.

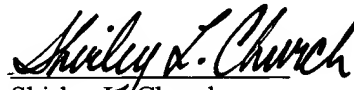
As argued above, it is the computer readable storage medium having program code for applicants' patented method and not the basic etching equipment which is the basis of the patentability of applicants' apparatus. It is applicants' contention that, if the process itself is patentable, then an apparatus which contains a computer readable storage medium having program code for performing the process is also patentable. Applicants contend that, without the hindsight gained from reading applicants' present disclosure, it would not have been obvious to one skilled in the art to use

equipment which was available in the art to perform applicants' process. This is because applicants' process was not known in the art prior to applicants' invention.

Applicants contend that all presently pending claims are in condition for allowance, and the Examiner is respectfully requested to pass the application to allowance.

The Examiner is invited to contact applicants' attorney with any questions or suggestions, at the telephone number provided below.

Respectfully Submitted,



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